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ABSTRACT

The preservice licensure and preparation of career and technical education (CTE) teachers was examined to determine whether changes in CTE teacher licensure requirements are necessary. Two overarching missions of CTE were identified. The first was traditional/tech prep (leading to employment). The second was a more general combination of education through occupations, work/family/community/technology, and tech prep (leading to employment or further education). The analysis focused on the following issues: (1) the external policy context (general teacher education reform trends and issues; teacher shortages); (2) the internal policy context (state testing requirements; increased training credentials of technicians; transition to work and postsecondary education; work-based learning; integration of academic and vocational education; special needs students; CTE teacher shortages; declining numbers and consolidation of teacher education

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programs); (3) policy constraints (multiple programs; lack of consensus regarding mission; state teacher licensure regulations; CTE teacher shortages); (4) policy variables (acquiring and certifying occupational/technical/subject-matter knowledge, academic credentials; instructional design/pedagogy; general knowledge; and assessment). The analysis resulted in five variations of the mission of CTE programs in public schools, as well as policy recommendations for CTE state licensure regulations, recommendations for CTE teacher preparation reform, and additional recommendations regarding modifying state CTE licensure requirements and linking CTE licensure/preparation reform to federal funding. (Contains 47 references.) (MN)

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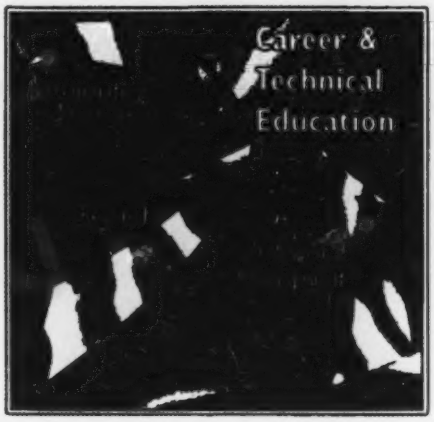

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A Public Policy Synthesis

Kenneth C. Gray
Richard A. Walter

Information Paper 1001

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Information Paper 1001

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Foreword

The Information Synthesis Project of the National Dissemination Center for Career and Technical Education seeks to assist career and technical education practitioners and policymakers in choosing and using the best information available to apply to practice and to serve as an intermediary between local and expert knowledge. This paper is the first in the Information Paper series, which is designed to review and synthesize research by giving an overview of a distinct topic or a cross-disciplinary analysis of an emerging topic.

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Executive Summary

Almost one-fifth of all credits accumulated by public high school students are in courses categorized as Career and Technical Education (CTE), formerly termed vocational education. One or more CTE programs are offered as electives in most public high schools. Not surprisingly, therefore, there are well over 100,000 CTE teachers in the nation's middle and high schools. The preservice licensure and preparation of this group of teachers is the topic of this monograph. Specifically addressed is the issue of whether changes in CTE teacher licensure requirements and teacher preparation programs are necessary and, if so, what should they be?

Analysis Framework

An immediate problem encountered in this analysis was determining who to include as CTE teachers. The benchmark National Center for Education Statistics (Heaviside, Carey, and Farris 1994) study identified 11 different types of CTE teachers/programs. Among these are the traditional six: business education, trade and industrial (T&I) education and health occupations, family and consumer sciences, technology education, agriculture, and marketing/distributive education. Although federal funding legislation regards them all as CTE, the reality is that they are all quite different from each other. In particular, they all have different missions; some, for example, have labor market student outcome goals and some do not.

In light of this diversity of programs, the approach taken in this analysis was to examine CTE teacher licensure and preparation from the perspective of CTE's mission within the public schools, not program titles such as T&I, agriculture, business, etc. The guiding rationale used in this monograph was as follows: (1) the mission of CTE, as reflected in how it is practiced in the public schools, should drive the specifics of teacher licensure and preparation; and (2) there may be several different missions among the various CTE programs and thus different licensure/preparation models.

From a review of the literature, two overarching missions were identified: traditional/tech prep (TTP), and a more general combination of education through occupations, work/family/ community/technology, and tech prep (ETO/WFCT/TP). In some cases unique recommendations are made for the two differing missions. The following discussion summarizes the external context for reform, the internal context for reform, policy implementation constraints, recommendation for CTE licensure reform, recommendations for CTE teacher preparation reform, and recommendations for implementation.

The External National Policy Context

Career and technical teacher licensure/preparation reform is part of and therefore influenced by the national teacher quality movement. Therefore, state and national reforms and other related development form the external contexts for this review of CTE teacher licensure/preparation change. This external context may be summarized as follows:

- The public views improving the quality of teaching as the most promising way to improve learning and thus public school effectiveness.

- Legislative action, at the state level, suggests a consensus that teachers "first and foremost" should be subject-matter experts.
- At the same time there is movement toward performance outcomes-based teacher preparation and assessment design to measure teaching effectiveness in the classroom.
- Virtually every state has instituted new teacher licensure/preparation requirements that apply, in varying degrees, to CTE teachers. They include proficiency testing in the areas of pedagogy, content knowledge, and general knowledge, as well as minimum undergraduate grade point averages for entering undergraduate teacher preparation programs and for initial teacher licensure.
- There is presently a serious teacher shortage, particularly in urban and rural school districts. It is estimated that over 1 million new teachers will be needed in the next 10 years.
- As result of teacher shortages, it is predicted that more teachers will be hired who have bachelor's degrees but have not completed formal university-based teacher preparation programs. As a result, these "alternate" routes to teacher certification will become more prevalent if not dominant in the next century.

Internal Policy Context

Although the national teacher quality movement is a powerful influence on CTE teacher licensure/preparation reform, some unique factors internal to CTE are prompting change:

- Most CTE teachers must pass state-mandated beginning teacher exams. CTE teachers without higher education experience often fail these tests.
- CTE teacher licensure regulations and preparation programs are based on obsolete assumptions regarding the world of work and student aspirations.
- The mission of CTE, as defined in federal legislation, now includes preparation for postsecondary education, particularly postsecondary prebaccalaureate technical education (Tech Prep).
- Youth apprenticeship and school-to-work programs have led to a renewed interest in providing work-based learning experiences for all CTE students.
- The movement to increase the academic skills of CTE students, commonly referred to as integration of academic and vocational education, requires teachers to teach or team teach relevant math, science, and communications content. CTE teachers are generally unprepared for this role.
- Special needs students now generate almost half of all CTE credits. In some CTE programs, special needs students are the majority. CTE teachers continue to indicate a general unpreparedness to educate special needs students.
- CTE instruction designed around a cluster of related occupations—as opposed to a single occupation—is now a federal development priority. A cluster approach to career selection and preparation is also commonly used in high schools that have career development efforts (career pathways, career majors, individual career plans, etc.).
- The number of college-based CTE teacher preparation programs has declined by at least one-third. Those that remain have been downsized or incorporated into larger curriculum and instruction programs.

Policy Implementation Constraints

As with all public policy, certain constraints make changing CTE teacher licensure/preparation difficult:

- Among the professionals in the six major CTE programs areas, there is little commonality except that all qualify for federal Perkins Act funds. Except for federal funding requirements, there is little leverage to bring these groups together to make common changes in CTE teacher licensure/preparation.
- Reforming CTE teacher preparation starts with changes in teacher licensure requirements. These regulations are state, not federal, legislative acts. Thus, reform could quite possibly require legislative action in all 50 states.
- There is a dramatic shortage of CTE teachers in nearly all of the six main program areas. The daily problem at the local level is not the rigor of CTE teacher preparation programs but rather finding teachers to fill classrooms. This situation will have a definite chilling effect on efforts to increase the rigor of CTE teacher licensure/preparation.

Recommendations for Reform of Licensure Requirements

In most states there is a menagerie of CTE teacher licensure certifications. In many cases, these certifications are no longer consistent with the actual mission of CTE as practiced in the public schools. It is common that CTE programs with the same title (technology education, etc.) will have different missions in different high schools. These differing missions can be reduced, however, to one defining factor: is preparation for full-time employment a student outcome goal? This argues for two main types of CTE: one that includes preparation for the transition to employment and another that does not.

Therefore, *it is recommended that all CTE licensure be reduced to just two types: Traditional/Tech Prep (TTP) and the more general Education through Occupations, Work/Family/Community/Technology, and Tech Prep (ETO/WFCT/TP)*. Which certification is necessary is determined by the mission of the program at the local school level.

An examination of CTE teacher licensure requirements suggests that these regulations address five major variables: (1) acquisition of occupational/technical knowledge, (2) minimum academic credentials, (3) instructional design and delivery—pedagogy, (4) acquisition of general education knowledge, and (5) outcomes-based assessment. Whereas there are two different overarching missions of CTE programs in the field, it is logical that there should be two different licensure/preparation programs (as opposed to the six or more that now exist). The two licensure/certification will differ with regard to the relative importance of the five policy variables.

TTP Licensure Recommendations

- All certification candidates will hold at least an associate degree or certificate in a relevant technology and will have an earned bachelor's degree as a condition for permanent certification.
- All certification candidates will have nonteaching work experience related to their teaching assignment, and subject-matter expertise will be independently assessed.
- All certification candidates who have not completed a formal teacher preparation program will complete an intensive teacher training program that includes classroom/laboratory safety and management as a condition for initial certification; they will be provided clinical supervision at their worksite during the first year of employment.
- All certification candidates who have not completed a formal teacher preparation program will be required to pass all state standardized testing requirements but as a condition for permanent not initial teacher certification.
- All certification candidates will complete an on-the-job performance assessment within the first 2 years of employment.

ETO/WFCT/TP Licensure Recommendations

- All certification candidates will hold a bachelor's degree, though not necessarily in education.
- All certification candidates who have not completed a formal teacher preparation program will complete an intensive teacher training program as a condition for initial employment and then will be provided clinical supervision at their worksite during the first year of employment.
- It is preferred that certification candidates have had noneducation work experience, prior to initial licensure, that is related to their teaching assignment.
- All certification candidates who have not completed a formal teacher preparation program will be required to pass all state standardized testing requirements but as a condition for permanent not initial teacher certification.
- All certification candidates will complete a on-the-job performance assessment within 2 years of employment.

Recommendations for Reform of Teacher Preparation Programs

Clearly, if preservice CTE teacher licensure changes, CTE teacher preparation program must also change. There would not seem to be, however, any reason to wait until reforms are enacted, if they are at all. What follows are recommendations that are viewed as independent of licensure reform:

- CTE teacher preparation programs should be organized around the two missions, not traditional program titles.

- Alternative (nonfull-time baccalaureate) certification programs consistent with state emergency/intern certification regulations should be developed.
- All CTE teacher preparation programs should anticipate performance outcomes-based assessment requirements.
- Regardless of mission, all future CTE teachers need training in the teaching of academic subjects, particularly math, science, and communications.
- Regardless of mission, all future CTE teachers need training in educating special needs students and diverse student groups.
- Regardless of mission, all future CTE teachers need training in the supervision of school-sponsored work-based learning.
- Regardless of mission, all future CTE teachers need general knowledge in work force education and career development theory and practices.

Recommendations for Implementation

This monograph is the latest in a series of attempts to reform CTE teacher licensure and preparation. It is fair to say that previous efforts have produced limited effects at best. Clearly, there are two main challenges to reform: deciding what changes are necessary and implementing them. Implementation is tremendously difficult because it is a state-by-state, university-by-university effort. Thus, it is concluded that if reform is to take place, then the following recommendations should be considered:

- Make CTE teacher licensure/preparation reform at the state level a requirement for receipt of Perkins funds.
- In order to lessen the impact of new regulations on local programs, strategies for phasing in the new requirements at the state level should be part of the reform package.

Introduction

Almost one-fifth of all credits accumulated by public high school students are in courses categorized as Career and Technical Education (formerly termed vocational education). One or more CTE programs are offered as electives in most public high schools. Thus, there are well over 100,000 CTE teachers in the nation's middle and high schools. The preservice licensure and preparation of this group of teachers are the topics addressed in this monograph. Specifically addressed is the issue of whether changes in CTE teacher licensure requirements and teacher preparation programs are necessary and, if so, what should they be?

CTE teacher preparation is not a new topic. It has been a point of contention from the very beginning of the CTE field (Lynch 1997). Unhappy with what they perceived as the ruination of manual arts by general educators, industrialists in the early 1900s wanted nothing to do with teachers prepared in colleges, and educators wanted nothing to do with teachers who were not prepared in college (Gray 1988). Ultimately, a compromise developed whereby agriculture, business education, and home economics teachers were prepared much the same way as other public school educators, in full-time baccalaureate teacher preparation programs. But teachers who taught courses related to trade and industrial (T&I) occupations were recruited from the workplace and typically had little or no formal education beyond high school. This dichotomy still exists today.

Today, debates regarding CTE teacher preparation have been reinvigorated by declines in high school CTE enrollments, declines in the number of CTE teacher preparation programs, and shortages of CTE teachers. Equally important are the emergence of public education reform in general and efforts to improve the quality of teachers in particular, as a "major" political issue at the state and national level. These developments have led to a significant amount of scholarly writing and debate among CTE teacher educators (Hartley and Wentling 1996).

Limitations

The intent here is not to duplicate previous scholarly work regarding CTE teacher preparation. Nor is the intent to present an extensive review of this literature or exhaustive account of CTE teacher licensure/preparation. Instead, this paper takes another look using a different perspective in the hope that it will be useful in stimulating debate, and ultimately consensus, that will in turn lead to reform.

This monograph addresses the issue of preservice CTE teacher preparation from a public policy perspective because CTE teacher licensure and preparation are ultimately dictated by legislative action at the state level. Thus, the analysis begins with a review of the external context of CTE teacher licensure and preparation, the case for change, policy constraints, and policy options and ends with recommendations.

Career and technical education teacher licensure and preparation are ultimately state-level issues. Thus, there are in fact 50 different variations of CTE teacher preparation regulations across the nation. Policy analysis requires certain assumptions about the present state of affairs, yet little or nothing can be stated about the specifics of CTE preparation and licensure that is

true in every state. Thus, some degree of generalization was required for this analysis. As an example, in most states T&I teachers are not required to hold a college degree, but that is not the case in all states. Nevertheless, the analysis is based upon the assumption that in general no degree is required.

The focus of this analysis is on preservice education—all that happens until the awarding of permanent state CTE teacher licensure. Of course, in light of ever-increasing rates of change in the workplace, the ongoing professional development of practicing CTE teachers is an equally critical issue. However, this issue involves a different set of variables and therefore it will not be addressed here.

The issue of how preservice CTE teachers should be prepared rests ultimately on the fundamental question, What is the mission of CTE education? Is the mission to prepare students for work and higher education or to teach academic skills? Teacher preparation programs would differ significantly depending on the answer. For these reasons, the question of CTE mission is addressed in this manuscript.

Who Are CTE Teachers?

Among the many variables confounding the issue of CTE preservice education is the thorny question of who exactly are the teachers under consideration. This would seem a rather straightforward question, one easily answered. Instead, it is a difficult question and perhaps the main reason why reforming CTE teacher preparation has never progressed far beyond the talking stage.

Roughly 25% of secondary-level teachers are classified as CTE teachers. Of this group, 79% teach in comprehensive high schools, the rest in separate vocational high schools. Within this 25%, however, there is more diversity than commonality (Heaviside, Carey, and Farris 1994). The benchmark *Public Secondary School Teacher Survey on Vocational Education* identified 11 different types of CTE teachers. Among these are the traditional six. Listed in order of the total percentage of all vocational teachers (not student enrollment) they are (1) business education (29%); (2) trade and industrial education (18%); (3) technology education/industrial arts (10%); (4) agriculture education (8%); (5) family and consumer sciences (8%); and (6) marketing/distributive education (4%). Others listed in the study are vocational and academic subjects (12%), occupational home economics (4%), technical/communications education (3%), health occupations (3%), and other vocational (2%).

Each of the traditional six programs is unique. Each, for example, has its own state and national professional organizations, unique licensure requirements, and often unique teacher preparation programs. Although all of these programs are included in the federal Perkins act, the fact is that many teachers within these six program areas do not even view themselves as vocational education teachers in the traditional sense. Historically, it was not a common mission that united these six programs. Instead it was 1917 political realities surrounding the need to gather enough votes to pass Smith Hughes, the first federal vocational education act, and later the

lure of federal dollars that brought these groups together. It was and is a marriage of convenience. For example, technology education's mission has, since is inception in the late 1800s, been to teach technology and broad "industrial arts" such as drafting and now the use of various technologies and processes, not preparation for employment. In recent years, agricultural education in many school systems has moved away from vocational agriculture to positioning itself as a part of the high school's science curriculum, thus counting toward state-mandated graduation requirements in science (see National Research Council 1988). Further, the focus of family and consumer sciences education has always been on the family, not career preparation. The point is that CTE is not a homogenous profession but a diverse set of different programs with different missions, making the development of a consensus regarding teacher preparation and licensure difficult.

Differences in CTE Teacher Licensure

Perhaps the most important difference between the various CTE programs is that there are two distinctive types of licensure models thus teacher preparation programs. The majority—business education, technology education, agriculture education, family and consumer sciences, and marketing/distributive education—all use the traditional four-year baccalaureate model used for elementary, middle school, and secondary education teachers. Although most of these teachers do have some occupational experience (Heaviside, Carey, and Farris 1994), in most states it is not a requirement for teacher licensure.

Both trade and industrial education and health occupations, on the other hand, typically use an alternative preparation/certification model that stresses work experience and occupational competence over academic credits completed and degrees earned. Thus, although a majority of health occupations teachers have degrees and most newly hired T&I teachers typically have at least an associate degree, the degrees are not required for entry into the teaching profession. On average, for example, T&I and health occupations teachers will have nearly twice as much work experience related to their teaching assignment (15 years) as other vocational teachers (8 years) and three times as much as academic teachers (6 years) (ibid.). Meanwhile, of the 8% of all public school teachers who do *not* have a bachelor's degree, virtually all are trade and industrial/health occupations teachers (Levesque, Lauen, Teitelbaum, Alt, and Librera 2000).

The diversity of CTE programs thus leads to the question, What exactly are we attempting to reform: the traditional baccalaureate mode, the trade and industrial/health occupations model, or both? The primary model used in CTE programs, except those within the T&I/health occupations grouping, is the same full-time undergraduate study model used throughout all of the non-CTE teacher preparation programs. Perhaps for this reason, the focus of past CTE teacher education reform debates has been—implied or otherwise—on replacing the nontraditional/alternative T&I model that has required extensive work experience but only a high school diploma. Rejecting the nontraditional/alternative model out of hand, however, no longer seems to be a prudent decision. As documented in this paper, dramatic teacher shortages in all K-12 education have led some to predict that these nontraditional/alternative licensure models (subject-matter knowledge but not formal teacher training prior to initial licensure) may be the future for all K-12 teacher preparation.

The approach taken in this analysis is to focus on CTE mission, not on program titles or the two different CTE licensure/preparation models. If all six programs have the same mission, then they should have a common preparation model. However, if they do not share the same objectives, then the models could be different. Stated another way, the mission of the program should drive both the licensure regulations and the content/format of the teacher preparation programs.

The External Policy Context

General Teacher Education Reform Trends and Issues

A beginning step in policy analysis is a consideration of the contemporary context that will influence the selection of policy alternatives. In the case of policy options for CTE teacher education, it is important to consider, as background, teacher licensure/preparation trends and issues generally. As an indication of the current importance of the overall issue of teacher preparation, the 32nd annual Kappan Gallup Poll (Rose and Gallup 2000) found, for example, that the public believes that the best strategy for improving school achievement is "qualified and competent teachers in every classroom" (p. 44). As an indication of the breadth of concern regarding teacher preparation, the National Alliance of Business, the Business Roundtable, and the National Association of Manufacturers jointly issued an extensive report titled ***Investing in Teaching*** (Koppich 2001) that deals solely with teacher preparation. Moreover, nearly every state has enacted new licensure requirements for public school teachers. Within the overall teacher quality movement there are four components related to preservice education that provide a context for CTE preservice teacher preparation: proficiency testing, subject matter expertise, minimum undergraduate grade point averages, and performance assessment/outcomes based teacher preparation.

Proficiency Testing

By the spring of 2000, 42 states had instituted a set of mandatory paper-and-pencil standardized examination requirements as conditions for teacher licensure. Such examination programs typically include testing in three areas: pedagogy, subject-matter knowledge, and general knowledge. The content of these tests is closely aligned with baccalaureate degree curricula and the related assumption that candidates will have completed nearly 60 credits of general education. Therefore, CTE teachers entering through the alternative—nondegree—licensure route typically have limited if any college experience and, therefore, frequently do not score well on the tests. Unfortunately, this set of circumstances has produced a paradox within which an individual who has been successfully performing in the classroom/laboratory might be dismissed for failing the licensing examinations. For this reason, some states have chosen to exempt CTE teachers from the examination requirements if a degree is not required for licensure. Although this solves the problem, many have questioned the wisdom of taking this direction (Gray and Wang 1989) because of its implication that it is less important for T&I/health occupations teachers to be literate. Other states have retained the testing requirements but have provided CTE teachers with alternate certification a longer period in which to prepare. The lasting effect, however, is that in many states all CTE teachers must eventually pass the tests or resign. In some cases, that forced resignation can occur after the individual has already completed up to 10 years of successful teaching. Thus, hiring individuals who have little or no higher education experience has become very problematic.

Subject-Matter Knowledge

A second variable that influenced teacher licensure reform in the late 1980s and early 1990s was the assumption that teachers were ineffective because they were not knowledgeable in the field(s) they taught (see Koppich 2001). It is proposed by some that subject-matter knowledge is the only thing necessary to be a good teacher (Wise and Leibbrand 2000). Some states sought to remedy this situation by instituting subject-matter tests as part of their initial teacher licensure requirements. Other states, however, have taken a more extreme approach by requiring candidates to complete an undergraduate major within the area in which they wish to be certified. Thus, a potential mathematics teacher would be required to have a baccalaureate degree in mathematics. Under this policy, pedagogy is considered either irrelevant or of minor consequence. Of particular importance to this analysis of CTE teacher licensure/preparation is that subject-matter expertise is now considered to be very important for all teachers and, therefore, a strong argument for alternative certification routes that do not require formal teacher training (Hawley 1992). This, in turn, raises questions about how CTE teacher education programs provide and assess subject-matter knowledge and the relative importance of pedagogy.

Minimum Grade Point Average

The third piece of conventional wisdom that has emerged regarding alleged poor quality of teachers is that those who are accepted into teacher preparation programs are the less-capable college students, therefore, resulting in less-capable teachers (Koppich 2001). In an effort to improve the quality of new teachers, some states have established a minimum undergraduate grade point average (GPA) as a prerequisite for admission to and graduation from a teacher licensure program. Pennsylvania, for example, recently adopted Chapter 354 of the Public School Code, *General Standards for the Institutional Preparation of Professional Educators* (**Preparation of Professional Educators** 2000). Included in its provisions are the following minimum grade point averages for admission into teacher education degree programs: 2.6 GPA for the 2001-02 academic year, 2.8 GPA for the 2002-03 academic year, and 3.0 GPA for the 2003-04 academic year. These requirements may well contain some unanticipated consequences for CTE if it is the less-capable college students who elect to be CTE teachers. It is also unclear how these regulations will affect those CTE teachers who enter the profession using the alternative nonbaccalaureate route. Traditionally, teachers in these programs have been permitted to "cap off" their postsecondary experiences without earning a baccalaureate degree. It is certainly conceivable that alternative route candidates, who are typically most in need of the expanded educational perspective provided through degree programs, may be excluded or dissuaded from enrolling by these minimum GPA requirements.

Assessment: Performance-Based Teacher Education

Although in the view of some policy makers subject-matter expertise is more important than pedagogical knowledge, teacher preparation professionals are equally adamant that subject-matter knowledge alone is not enough to ensure effective teaching (Wise and Leibbrand 2000). The National Alliance of Business tends to agree, calling for performance-based licensing that includes assessment of both subject-matter knowledge and the ability to teach. Furthermore,

critics of teacher preparation programs allege that there is a disconnection between what is taught in the college and what students need to know to be successful in the classroom. Only 20% of new teachers polled nationally indicated that they felt adequately prepared to integrate technology into their classrooms (Lewis, Parsad, Carey, Bartfai, Farris, and Smerdon 1999). Although college faculty are often focused on social reconstruction and getting tenured, most students are worried about such mundane issues as class discipline, something about which many faculty know little. Responding to this criticism, the National Council for Accreditation of Teacher Education (NCATE)—the main organization for accrediting teacher education programs—announced that it was moving toward outcomes-based standards called NCATE 2000 (see http://ww.ncate.org/2000/pressrelease.htm). In the same vein, the National Council on Teaching and America's Future recommended that state licensure requirements conform to the outcome-based standards such as those set by the Interstate New Teacher Assessment and Support Consortium (INTASC).

What actual impact the outcome assessment movement will have on teacher preparation programs is uncertain since the Candidate Performance Objectives are quite general (Wise and Leibbrand 2000). Classical outcomes-based education methodology starts with an assessment of the areas of competence that teachers must possess in order to be successful. It remains to be seen if such assessments will occur, or whether the curriculum will still be a function of the philosophical biases of the faculty—what they know and what they feel like teaching. Nonetheless, in 2000, the state of Ohio became the first to require new teachers, beginning in 2002, to pass a classroom performance test (Praxis III) during their first 2 years in the classroom.

Professional Standards Board

Following the example of other professions, in the 1990s there has been interest in establishing professional standards for teachers. The federally funded National Board for Professional Teaching Standards was created in 1987 to lead the effort to develop professional standards in various subject matter areas including Career and Technical Education:

> The mission of the National Board for Professional Teaching Standards (NBPTS) is to establish high and rigorous standards for what accomplished teachers should know and be able to do; to develop and operate a national, voluntary system to assess and certify teachers who meet these standards; and to advance related education reforms for the purpose of improving student learning in American schools. (http://www.nbpts.org)

By 2000, 29 states had enacted legislation to provide financial incentives for teachers to become nationally certified. New York provides a $30,000 bonus over 3 years to teachers who become nationally certified. (Keller 2000). It is interesting to observe that the American Association of Family and Consumer Sciences has had a national licensure program since 1987 (http://www.aafcs.org/certification/index.html).

Although national standards boards do not directly affect new teachers and thus preservice teacher education (candidates are expected to be veteran teachers), the fact that 15 states have now established their own professional standards boards could be relevant. Significantly,

board members are primarily teachers and, in some states, teacher licensure regulations have been turned over to these groups. It can be predicted that the process and politics of securing CTE teacher licensure reform would be quite different where such standards boards exist and are dominated by academic teachers.

Teacher Shortages

Ironically, as reforms to increase the rigor of teacher education programs were established, a new problem arose—teacher shortages. While states were busy making teacher licensure more rigorous, increasing school enrollments, teacher retirements, and large numbers of teachers choosing to leave the field have produced shortages. By the late 1990s, the issue of unfilled teaching positions was front-page news. It is estimated that the nation will need 1 million new teachers by 2010. Of the 10 licensure areas that will experience the greatest replacement needs through 2008, elementary teacher is ranked third and high school teacher fifth (Dohm 2000). Technically, there is an ample labor supply of teachers to meet the demand; however, the number who are willing to work in urban/rural areas and/or for the salaries offered is inadequate. Shortages were particularly acute for middle school and high school math, science, special education and, as will be discussed, career and technical education teachers.

By the late 1990s, the problems associated with filling teaching positions were beginning to overshadow the issue of how to make new teachers more proficient. Of note are the efforts to provide alternative routes to licensure and financial incentives for students who pursue a career in teaching.

Nontraditional/Alternative Licensure

As a result of teacher shortages, there has been an increase in the support for alternative licensure procedures that permit individuals with subject-matter expertise to become certified without completing a teacher education program. Aside from dramatically increasing the potential pool of beginning teachers, some research studies suggest alternative routes are more effective in attracting both men and minorities to teaching (Olson 2000). "What we are seeing are market forces in action" (Feistritzer 2000, p. 1). Indicative of the trend, a rural state, Utah, and an urban state, Florida, both passed legislation in 2000 providing alternate licensure routes for highly qualified individuals (Keller 2000). Significantly, although some states may have specific alternative teacher licensure legislation, virtually all (48 in 1990) have emergency licensure provisions that allow for circumvention of the traditional requirements (American Association of State Colleges and Universities 1995).

Thus, against a background of increased rigor in teacher licensure, teacher shortages are leading to the hiring of more and more teachers with emergency certificates who enter the teaching profession with little, or no, teacher preparation. With the press reporting that only 50% of the graduates of formal teacher preparation programs become teachers, many began to view alternate routes to be of equal, if not greater importance than traditional teacher preparation programs (Kantrowitz and Wingert 2000).

This "new" alternative means of addressing the shortage of teachers is, of course, *the* model that has been used for some CTE program areas for the last 85 years. Thus, as CTE educators argue the wisdom of the alternative licensure route in general, and work experience requirements in particular, states are implementing laws to expand the availability of similar alternative routes as a means of increasing the supply of academic teachers.

Financial Incentives

Another reason teacher shortages exist is low pay (Ballou and Podgursky 1998; Koppich 2001). Low pay has been a traditional problem both for those CTE programs that seek to lure experienced skilled technicians from business and industry and for CTE teacher preparation programs that provide graduates with skills in demand in the private sector. The latter is now clearly a problem in technology education, where skills learned in teacher preparation programs are in high demand by industry and the pay is twice as much (Weston 1997). Frequently, local teacher contracts and/or governing boards have prevented local education agencies from paying what was necessary to attract CTE teachers. Thus, it is important to note that by 2000, many states were willing to address both the issue of increases in pay overall and financial incentives for individuals who pursue teaching careers. New York, for example, now provides scholarships of up to $3,400 per year to individuals who are willing to teach within geographic areas or in subjects where there are shortages (Keller 2000).

Summary

General K-12 teacher preparation in 2000 was responding to two different issues: (1) the perceived need to improve the quality and rigor of teacher preparation as a means of improving schooling; and (2) the need to fill 1 million teacher vacancies in the next 10 years. Classic labor-supply theory suggests that these two goals are incompatible. Nonetheless, policy makers at the turn of the 21st century were diligently in pursuit of both (Darling-Hammond 2000). Their answers seem to be to increase the rigor of traditional programs and increase the availability of alternate routes licensure as a temporary solution. With this perspective of the issues and trends in general teacher preparation as background, we turn to the reformation of career and technical education teacher preparation.

The Internal Policy Context: The Case for Change

When the policy issue of reforming CTE teacher preparation is raised, CTE educators tend to agree that the answer is yes. But as Lynch (1996) points out, the general agreement ends at that point. There is considerably less agreement about why and how CTE preparation should be changed. Thus, it seems useful for this analysis to discuss briefly those developments that lead the profession to agree that reform is necessary. Obviously, much of the pressure for change stems from the overall national teacher quality movement discussed in the preceding chapter. But the fact that the American Vocational Association has changed its name to the Association for Career and Technical Education suggests that the CTE professionals sense things in their field have changed as well. There are at least eight specific developments making the case for CTE teacher licensure/education reform.

State Testing Requirements

As discussed earlier, the majority of states have instituted standardized testing requirements for either entrance into a teacher preparation program or for licensure. These tests often assess not just subject-matter knowledge but pedagogy and general knowledge as well. Frequently, CTE teacher licensure candidates do not score well on these tests, particularly those who come directly from business and industry having formal education that did not go beyond high school or whose postsecondary education was in the distant past (Gray and Wang 1989). Some states have exempted these teachers, whereas others have provided them with a longer period of time within which to pass the test. It is quite possible, however, that ultimately all CTE teachers will have to pass the tests in the majority of states. Even if they do not, major questions remain. Is it in the best interests of CTE and its students to have teachers who have not taken and passed state licensure tests? Is it in the interests of CTE to have teachers who are regarded as "less than" by their general education peers because they did not pass the same test everyone else did?

Increased Training Credentials of Technicians

Historically, CTE was designed to prepare youth for the apprenticed trades, particularly in manufacturing and construction, or to be family farmers, competent homemakers, and businesspersons (see Gray 1988). In many ways, however, the world of work and our communities have changed dramatically, as have the aspirations of youth. For example, until relatively recently most of the traditional skilled craft occupations did not require a postsecondary degree or certification for entry-level positions. Now, many of these occupations require either certification or associate degrees, at the prebaccalaureate postsecondary level. Thus, although traditional CTE teacher licensure—and therefore many teacher preparation programs—are based on the assumption that the goal is preparing students for full-time employment, working on the farm or in the home, many CTE students from all six programs now choose to enroll in higher education directly after high school. This suggests that CTE teachers need to be trained in preparing students for both the transitions to work and to higher education. This reality is reflected in an expanded mission for career and technical education.

Dual Mission: Transition to Work and Postsecondary Education

With the inclusion of tech prep in the Carl Perkins Act of 1990, the mission of Career and Technical Education, at least as defined by federal legislation, was expanded to include both preparation for full-time employment and preparation for postsecondary prebaccalaureate technical education. Since then, the percentage of CTE students choosing to postpone their entrance into the work force following graduation from high school by continuing their education has increased. According to the National Center for Education Statistics (Levesque et al. 2000), during the 12-year period of 1982-1994, the percentage of vocational majors enrolled in postsecondary study within 2 years of their graduation date increased from 42% to 55%. During the same period, the number of students who completed both a college preparatory curriculum and a vocational concentration increased from 0.6% to 4.5%. In some program areas, such as electronics and drafting, it is frequently the majority of students who select this option. This dual mission suggests that if CTE teachers need occupational experience to provide credibility and relevance to their instruction, they all should also have some college-level academic experiences for the same reason.

Clustered/Generic Occupational Focus

At present, many CTE programs, especially those within T&I, are occupation specific. The student performance goal is mastery of as many occupational skills as possible in a specific occupation. State licensure regulations for the teachers of those programs are correspondingly occupation specific; the typical T&I certificate enables the individual to teach a specific occupational program such as automotive mechanics, automotive body repair, welding, etc. An alternative idea is to organize instruction around broadly based clusters of occupations to provide students with a breadth of knowledge in several related fields as opposed to in-depth training within a single trade. This concept was proposed by Maley (1975) as a result of his research from 1965-1969; however, it was never widely adopted.

Now, however, the profession seems to be more receptive to clustering for several reasons (Hoachlander 1999). First, and most important, the strict distinctions that existed among the traditional crafts and trades have given way to a blurring of the lines reflecting the increasing need for more versatile technicians. Thus, many employers now desire technicians with a set of related skills, and their salaries are often determined by how many skill sets they possess. Thus, the labor market advantage of students is frequently increased by possession of a more diverse skill set.

Second, in response to the importance of helping teens develop career direction as a basis for postsecondary planning (Gray 2000), many school districts have instituted career majors or pathways as part of the high school curriculum. These programs are always organized around broad clusters of occupations.

Finally, clustering has become a federal priority for career and technical education. As an indication of the trend toward broadly defined program areas, the U.S. Department of Education

started an initiative in July 2000 to promote career-clustered programs, beginning with 5 groups and a plan to develop a total of 16. Examples include health sciences, information technology services, manufacturing planning, and transportation. The stated intent of these clustered curricula is to provide both career exploration opportunities, a context for academic education, and provide relevant occupational training. The intent is that students who "graduate from a career cluster will receive both a diploma and a 'skills certificate' that would be recognized across the country" ("ED Announces Grant Solicitation" 2000, p. 3).

CTE programs of study organized around clusters of related occupations have implications for state licensure requirements that are typically occupation specific. In many states, teacher licensure does not exist for such broad-based programs, thereby hindering the needed reform.

Work-based Learning

Aside from cooperative education, marketing/distributive education, and supervised field experiences in agriculture, CTE has traditionally taken place inside of school buildings and CTE teacher preparation programs have been designed to prepare prospective teachers for the role of classroom/occupational laboratory instructor. In the 1990s, school-sponsored and supervised work-based learning gained popularity (Bailey and Hughes 1999), the best indicator being the school-to-work legislation with its emphasis on learning in the workplace. The rationale is quite compelling. When the goal of CTE instruction is to provide students with a smoother transition from high school to full-time employment after graduation, then the most effective way to begin is to provide students with opportunities to earn academic credit for work experiences while in high school. Incorporating such experiences into the secondary-level curriculum increases the employers' likelihood of regarding such programs as a way of screening potential employees, and it provides students with a means of verifying career decisions. "In 1997, of those employers who reported hiring front-line workers with prior work-based learning experience (cooperative education, internships, or apprenticeships), most were more satisfied with these new hires than with other newly hired front-line workers aged 18-25" (Levesque et al. 2000, p. 44).

Work-based learning also has advantages for CTE students who choose to enroll in higher education. Arguably the best predictor of success in college is having a verified career interest—thus a goal (Gray 2000). Therefore, CTE students who go on to prebaccalaureate technical education benefit from having verified their tentative career choice by actually working in the field. Meanwhile, these experiences generally provide the very context for their postsecondary studies.

In the past, only students who were candidates for cooperative education, marketing/distributive education, and agriculture education teacher licensure were trained in administering work-based learning. In the future, all CTE teachers need such training.

Integration of Academic and Vocational Education

Another federal priority beginning with 1990 Perkins Act is strengthening the academic skills of vocational students by integrating academic instruction with occupational instruction. The

idea was that (1) the future workplace required higher levels of academics skills and (2) CTE/occupational education would be an effective context within which to teach these higher-level academic skills. Some even argued that this should be the sole role of CTE in the future.

In an attempt to provide clarity missing in the Perkins legislation, researchers at RAND investigated the definition of integration. They identified four themes that together define the integration of academic and vocational education (Rand Corporation 1994, p. 1):

- Richer, better sequenced curricula that enhance academic and generic skills needed by all workers;
- Facilitative instruction (rather than didactic) that motivates students to learn and provides them with a practical and applied understanding of the world;
- Increased collaboration and coordination among academic and vocational teachers to create a more unified schooling experience; and
- More attention to the skills and knowledge students need to transition effectively from school to work and college.

However, surveys of CTE teachers indicated that if these instructional objectives are to be achieved, CTE teachers' behavior and preparation will have to change dramatically. To begin with, very little time is spent by CTE teachers teaching academic skills (Heaviside, Carey, and Farris 1994) even though opportunities to do so are frequently presented. Equally important, although 91% of CTE teachers indicated they felt prepared to teach vocational subject matter, only about half felt adequately prepared to teach algebra and only 29% felt they could teach problem solving using math more advanced than algebra (ibid.).

In light of this research, it is obvious that, if the role of CTE were to evolve to include teaching academics, then teacher preparation would need to change. As pointed out by Gene Bottoms of High Schools that Work, vocational teachers are now being asked to teach math beyond the level they ever studied. This suggests that work experience in lieu of higher education is no longer a viable model for CTE teacher preparation and that perhaps a new mixture of requirements is needed.

Special Needs Students

During the '60s, '70s, and '80s, increasing access to CTE by special needs students was a federal priority. Specific provisions within the Vocational Education Acts of 1963 and 1968, the Vocational Amendments of 1976, the Carl D. Perkins Acts of 1984, and the Carl D. Perkins Vocational and Applied Technology Education Act of 1990 clearly reflect the increasing interest in expanding the opportunities provided for special populations. By the 1990s, however, the access problem had reversed itself; in many cases, special needs students were now the majority (leading, ironically, to charges of tracking). "As a result, while 34 percent of the graduating class of 1992 were special education students (disabled, disadvantaged, or LEP [limited English proficient]), 43 percent of the vocational credits earned by this class were earned by special population students" (Boesel et al. 1994, p. 17).

Many vocational teachers do not feel that they possess the level of competence necessary to accommodate special needs students. When asked to identify their biggest deficiency, number one is how to deal with special needs students, who may be the majority in their class. So consistently does this factor surface that Harvey (1999) recommends that all CTE teachers complete at least 6 semester hours of coursework focused on understanding of the classifications, legislation, general modifications/accommodations, instructional strategies, classroom management, and development of Individualized Education Plans/Individualized Vocational Education Plans.

CTE Teacher Shortages

As discussed in the next chapter, there is a general shortage of career and technical education teachers. In some programs, such as technology education, the shortage is so severe that it threatens the program of study's very existence—school systems that cannot find CTE teachers often just drop the program (Weston 1997). Although the problem is complex, one conclusion is unavoidable: the present system of CTE teacher preparation, based upon full-time baccalaureate study, simply does not have the capacity to meet the demand.

Declining Numbers and Consolidation of Teacher Preparation Programs

A final reason to consider the reform of career and technical teacher preparation is the reality that fewer and fewer university programs have CTE teacher licensure programs (Dykman 1993). Through the 1970s, the majority of CTE teacher preparation programs were discipline specific. For example, separate programs and faculty could exist for agriculture, business, family and consumer sciences, as well as trade and industrial, all within the same academic department. Often these departments were quite large in terms of both faculty and enrollment. Concurrent with the decline in CTE high school enrollments in the late 1980s, enrollment in CTE teacher preparation programs also declined, as did the number of CTE teacher preparation programs. It is estimated that of the 432 institutions that offered CTE teacher licensure programs in the 1980s, there were at least one-third fewer by the 1990s (Dykman 1993). One development is especially important—consolidation. Although many higher education programs were simply eliminated, those that survived were typically downsized (Hartley and Wentling 1996). Perhaps the most important effect of this reduction and consolidation is that CTE teacher educators find that they can no longer offer two to five unique programs. Therefore, they seek to combine CTE teacher preparation into a single common program of study and to find a rationale/consensus for doing so.

Summary

There are significant reasons to suggest that career and technical teacher licensure/preparation needs to change:

- CTE teacher candidates generally cannot pass state certification/licensing examinations, especially in pedagogy and general knowledge, without some postsecondary preparation.

- The traditional labor markets on which CTE has focused have evolved; many occupations now require some postsecondary education. Therefore, the primary mission of CTE programs has expanded to include the preparation of students for entry into the work force and/or postsecondary study.

- The instructional content of CTE programs has been expanded, requiring teachers to teach higher level academics as well as to initiate and supervise work-based learning.

- Special needs students often are the majority in some CTE classrooms; providing effective instruction for these students requires special training.

- The present system of teacher preparation is not meeting the demand for teachers. The number of institutions that provide CTE teacher education has declined, and many of those that remain have been forced to consolidate their preparation programs. It is unlikely that teacher preparation models that are predicated on full-time undergraduate students alone will ever have the capacity to meet the demand.

Policy Constraints

Public policy options are always limited by constraints; money to implement the policies is the best example. Frequently, the best policy solution is the most expensive and thus a cheaper solution is implemented. In fact, public policy has often been described as the art of finding the possible, not the perfect. Policy that ignores these constraints often leads to disappointment, if not outright failure.

At least four major constraints exert influence upon the implementation of new policy options for the preparation of CTE teachers: (1) multiple programs, (2) lack of consensus regarding CTE mission, (3) state teacher licensure regulations, and (4) teacher shortages.

Multiple Programs

At present, there are at least six different CTE program constituencies: business education, trade and industrial education and health occupations, family and consumer sciences, technology education, agriculture, and marketing/distributive education. Each typically has unique state teacher licensure and unique preparation programs/degrees. From the perspective of developing consensus, an equally important obstacle is that each of these program areas has a unique professional organization both at the state and national levels. Some of these professional organizations are very strong, influential, and independent. On the other hand, the program with the largest enrollment, T&I, really does not have a single national organization other than its student organization. Therefore, a discussion of changing CTE teacher preparation is really a discussion of changing six or more professional groups with varying degrees of influence. Among the many problems this causes is the reality that there is no existing mechanism to establish an effective dialog among the six constituencies at the national level, either to reach consensus on a common mission or to address the need for the reform of CTE teacher preparation. The simple question of who would be invited to the discussion is confounding at best.

Lack of Consensus Regarding Mission

As argued previously, the "ideal" CTE teacher licensure/preparation model depends primarily upon the mission. Is the mission the transition of students to full-time employment, the transition of students to postsecondary education, or the teaching of academic concepts to all students? The design and delivery of CTE teacher education would be quite different depending upon the answer to that question. There is not, however, any consensus regarding this issue among the various CTE constituents. Arguably, each has a different mission and the same program may have different missions in different high schools.

State Teacher Licensure Regulations

In all states, teaching CTE programs in public secondary schools requires licensure, and in a few states licensure is also required to teach postsecondary CTE in community and technical colleges. These regulations provide the template from which teacher preparation programs are

constructed. Although higher education faculty do have latitude in how to fulfill the requirements, they are powerless to change them; only state legislatures, state boards of education, and/or licensure boards can accomplish that objective. The degree of difficulty encountered in the process of changing state-level teacher licensure regulations can range from difficult to impossible, and change will not happen without significant support from local practitioners, particularly CTE administrators and union members, who can influence the political process. Yet the task is daunting; 6 different programs in 50 states means 300 plus revisions across the nation. It is doubtful that meaningful CTE teacher education reform will happen consistently across the nation without some federal leverage being applied.

The importance of understanding the role of state-level teacher licensure requirements in teacher preparation programs cannot be overstated. If there is one criticism that may be made of earlier attempts at reforming CTE teacher licensure, it is that the discussions and recommendations seem to assume that teacher preparation programs drive licensure. In reality, it is exactly the reverse. State licensure requirements drive teacher preparation. Thus, the issue is not how to reform CTE teacher preparation programs but rather how first to change CTE teacher licensure stipulations (see next chapter).

CTE Teacher Shortages

The most formidable constraint facing the reform of career and technical education teacher licensure/preparation is the shortage of CTE teachers. CTE teachers are almost universally in short supply. Virtually every state has an emergency teacher licensure provision that allows administrators to hire individuals who have not met the formal teacher preparation requirements. Reluctantly, most CTE administrators would agree that a marginally prepared teacher who is a subject-matter expert is preferable to no teacher at all. Thus, although teacher licensure continues to become more rigorous nationwide, the number of individuals who enter the profession with emergency licensure is also climbing and alternatives to formal teacher preparation programs are becoming more numerous. In short, when classrooms do not have teachers, all licensure rules are off, and that is the present situation in CTE.

Policy Variables

Typically, CTE teacher licensure legislation/regulations address, directly or indirectly, four issues that in turn become the basic framework of teacher preparation programs: (1) acquiring and certifying occupational/technical/subject-matter knowledge, (2) minimum academic credentials, (3) instructional design and delivery (pedagogy), and (4) general knowledge. It can be predicted that in the near future a fifth will be added: clinical assessment of actual classroom performance in the classroom. Although national accrediting groups such as NCATE, may mandate additional requirements and college faculty may elect to add additional local requirements as well, these five variables are consistently present in all licensure/preparation programs and thus a useful way to analyze CTE teacher preparation policy. What follows is a discussion of each of these variables as they relate to CTE teacher licensure/preparation.

Acquiring and Certifying Occupational/Technical/Subject-Matter Knowledge

As discussed earlier, one outcome of the national debates and reforms regarding teacher preparation and the quality of teachers is the consensus that the teachers should be subject matter experts in the field(s) they teach. In some states, for example, new high school teachers now must have an undergraduate major in the field in which they wish to become certified. Therefore, one variable in CTE teacher licensure/preparation is what subject-matter knowledge is necessary, how candidates will acquire it, and how it will be verified. The model generally used for K-12 academic teachers is to provide subject-matter expertise, as well as pedagogy, as part of the baccalaureate preparation. The assumption is that successful completion of the degree implies mastery of subject matter, an assumption that many states are now verifying through their teacher licensure testing programs.

The baccalaureate model of providing subject-matter expertise through undergraduate coursework is used in all CTE teacher preparation except the T&I and health occupations grouping. There are, however, questions regarding the effectiveness of this model. To begin with, the domain of subject-matter knowledge in most CTE programs is occupational, not academic. This creates three specific challenges:

1. Teaching CTE occupational knowledge, if it is to be classroom based, requires unique and generally very expensive facilities. As enrollments in CTE teacher preparation programs decline, the cost per student to maintain these labs becomes not just a burden but often pathological, leading to the elimination of the program. Many CTE teacher preparation programs have been closed not just because of declining enrollments but also because colleges simply needed the space that the occupational labs occupy.

2. The present rate of change in most occupations makes it is virtually impossible for CTE teacher educators to keep abreast of occupational developments and still fulfill the expectations for the role of faculty member.

3. Attracting individuals with both technical knowledge and academic credentials commensurate with faculty status is extremely difficult for a number of reasons, including salary.

In light of these three factors, the traditional method of teaching occupational/technical/subject-matter knowledge as part of a full-time undergraduate program may be less and less viable in the future.

Trade and industrial education as well as health occupations have historically relied upon successful work experience as verification of occupational skills and knowledge. However, the assumption that years of successful work experience are related to sufficient technical competence is increasingly questionable. Depending upon the nature or region of employment, a candidate's knowledge may be antiquated even though he or she is very successful in the current position. Some states, such as Pennsylvania, use additional occupational competency assessment procedures as a means of verifying technical competence. According to the National Occupational Competency Testing Institute (1999), 18 states currently require completion of the appropriate Experienced Worker Test as part of the CTE teacher licensure process.

A more recent option is to require prospective T&I/health occupations teachers to have a related associate degree and/or technical certificate in the field within which they are seeking teacher licensure, in lieu of an examination and, in some cases, of work experience. The advantage is that CTE teacher candidates who have formal technical education in the field they teach as well as higher education experience are better prepared to develop instruction designed to facilitate the transition from school to postsecondary technical education. An additional advantage is that CTE teacher preparation programs would not be required to have occupational instructional labs.

There is one further important point to make regarding occupational experience when the mission is successful transition to full-time employment. One of the main reasons that individuals fail on the job despite success in training is the inability to deal with the unique work culture that exists in every occupation. This is particularly true of women entering nontraditional occupations. An understanding of the work culture to facilitate the preparation of students to succeed within it can be gained only by having "been there" and "done that." It cannot be learned in college courses. Therefore, when the mission of CTE programs includes the transition from school to work, there is value in a limited amount of work experience, even when the subject matter is learned in a formal education setting such as a community or technical college.

Is Work Experience Necessary?

Requiring occupational experience or a related associate degree/occupational licensure in lieu of a 4-year college degree for career and technical teacher licensure is much debated among CTE professionals. Research results are mixed. Lynch (1996), in his review of the literature completed as part of the 1994 National Assessment of Vocational Education, reported that there was little evidence of a relationship between years of occupational experience and teaching effectiveness for experienced teachers, but that a relationship did exist for beginning teachers. Walter (1984) found a correlation between at least 2 years of related work experience and the attainment of tenure by secondary-level vocational teachers. Although occupational experience was not found to be related to student performance, it was correlated with credibility of

the teacher in the eyes of their students. A university degree on the other hand, was associated with professionalism, student learning, and longevity in the teaching profession.

These research results suggest that occupational experience is not related to teaching effectiveness but it is related to the issue of instructor's credibility in the eyes of their students and thus is of particular importance to new teachers. It is useful to remember, however, that the historical purpose of the occupational experience requirement, when it was implemented in the early 1900s, was *not* to improve the quality of teaching but to ensure that those who taught industrial education were subject-matter experts. Industrial education reformers, particularly those with the National Association of Manufacturers, were concerned that without an occupational experience requirement, vocational education teachers would be graduates of 2-year normal schools (and therefore mostly women) like most other teachers at that time. Thus, these teachers would know nothing about occupational skills such as tool making, electrical installations, construction, etc. (Gray 1988). Therefore, the purpose of occupational experience was to serve as a proxy for subject-matter knowledge.

Thus, the real issue is not "work experience—yes or no" but rather, how subject-matter expertise is acquired and assessed. The goal is to ensure that CTE teachers are subject-matter experts. If it is not learned on the job, where can it be learned? In light of the cost of maintaining occupational teaching labs, is attempting to teach subject-matter expertise through degree program course requirements still a viable option for CTE teacher preparation programs? Is a relevant technical certificate/associate degree/advanced degree a sufficient indicator, or is a formal assessment such as NOCTI written and performance tests still needed? Is some amount of occupational experience still desirable even if a candidate has the relevant certificates/associate degrees or advanced degrees?

Academic Credentials

State teacher licensure regulations always set a minimum educational/credentials level: associate degree/certificate, bachelor's degree, registered nurse, licensed cosmetologist, etc. Currently, most states require agriculture, business education, family and consumer sciences, marketing/distributive, and technology education teachers to have at least a bachelor's degree for entrance into the profession. Meanwhile, in the majority of states T&I and health occupations teachers need only be high school graduates but with relevant work experience and licensure.

There are many reasons to believe that a high school diploma alone may no longer be sufficient. To begin with, in many states all CTE teachers must pass standardized examinations to be certified, and success on these exams is highly correlated with higher education experience. Second, many high school CTE students now choose to enroll in formal postsecondary education immediately after graduation. This argues for all CTE teachers having some level of postsecondary education independent of how they gain occupational/technical knowledge. Third, the need to teach advanced math and science skills in CTE classrooms requires CTE teachers to have completed advanced math and science courses that are normally associated with admission to, or graduation from, higher education degree programs. Finally, there is the longstanding gulf between academic teachers and CTE teachers who do not have degrees. One

feels superior, the other inferior. This gulf hinders efforts by secondary-level faculty members to integrate vocational and academic curricula.

Instructional Design and Delivery (Pedagogy)

Although subject-matter expertise is essential, teachers are not paid to be subject-matter experts. Rather, they are paid to promote learning. Who among us has not heard the complaint that the teacher really knows his/her subject but cannot teach it to the students? If students do not learn, then the teacher has failed. There are those individuals deserving of the label of "natural-born" teacher, who do the correct thing to promote learning intuitively. However, it is clear that there is no evidence that success in the workplace automatically guarantees success as a teacher. If this were not the case, then the numerous train-the-trainer programs in business and industry would not exist. Therefore, instructional design and delivery are skills that must be taught.

The policy issue is not whether all CTE teacher candidates need pedagogical training, rather how they are to secure it. The most common model is classroom-based methods courses taught in traditional settings, followed by practice teaching of varying degrees of intensity. However, there seems to be movement toward more learning center environments to teach pedagogy. In this model, undergraduates spend more time learning on the job by actually working in schools and less, or no, time in traditional methods courses. Some universities have even reintroduced the concept of operating their own training schools, an idea widely abandoned in the 1960s. The learning center movement suggests that CTE teacher preparation should also look to a deemphasis of teaching methods courses and more emphasis upon in-the-classroom experiences.

Of equal, if not greater, importance is the issue of growing teacher shortages. With the need for new teachers estimated to be in the 1 million range over the next 10 years, it is predicted that more and more new teachers will enter the classroom with no formal teacher training. At the same time, most states do require that these individuals get involved in teaching methods training while on the job. One method currently used in alternative certification of CTE teachers requires a 1-week intensive train-the-trainer program prior to entering the classroom, followed by 2 years of formal clinical supervision of instruction provided by Penn State faculty at the teacher's school.

In general, the developments discussed here suggest that CTE teacher preparation programs need to consider moving away from the exclusive reliance upon traditional classroom-based methods courses toward more school-based instruction. In the extreme, CTE teacher preparation programs may find that a majority of new teachers in the future did not graduate from their programs at all. Thus, how to provide teacher training to this group will be the major challenge.

General Knowledge

Aside from the consensus that teachers should be subject-matter experts, conventional wisdom, with little supporting evidence, suggests that they also must be generally/liberally educated. Many states require a general knowledge test as part of the licensure/certification process. If CTE teachers must successfully complete these examinations, then CTE teacher preparation programs must include general knowledge. Furthermore, because teaching related math and science is now an instructional objective in CTE, it becomes important that career and technical teachers have more advanced math and science skills. The relative importance of this issue is linked to the issue of minimum degree requirements for all CTE teachers. New teachers who enter the field with an associate or higher degree will have already completed general education coursework as part of the degree requirements. This will likewise be the case with the majority of those who enter through the alternative route where teacher preparation is not required but a relevant degree is required. The real challenge will be presented if states continue to allow CTE teachers to enter the field through an alternate certification route with work experience requirements in lieu of a degree but still mandate the passing of a general knowledge test.

Assessment

The newest outcome of the teacher quality movement is performance/outcomes-based assessment. Seeing little relationship between success in colleges of education, as indicated by grade point average, and performance in the classroom, there is a significant movement toward assessing what a prospective teacher can actually do. In CTE, this would seem to include how to assess subject-matter expertise that is often occupational in nature and how to assess classroom-teaching skills. Early developments suggest the method may well be dictated by state teacher licensure legislation while a broad outline will be supplied by NCATE to those institutions that are accredited. In some CTE areas, formal subject-matter assessment instruments, such as those by NOCTI, are available. Nonetheless, it can be predicted that most, if not all, CTE teacher preparation programs will have to develop authentic assessment methods in the future.

What Is the Mission of CTE Programs in the Public School?

The guiding rationale taken in this analysis is that CTE teacher licensure/preparation policy should be guided by the mission or purpose of the programs in the public schools. Stated another way, the specifics of CTE teacher licensure/preparation should be guided by the mission of the programs in which the students are preparing to teach. Thus, the question of reforming CTE teacher licensure/preparation and/or making specific recommendations regarding the five policy variables discussed in the preceding chapter comes down to this: What is the mission of career and technical education?

Five Variations

In the broadest sense, there would seem to be three different possible missions for CTE: (1) preparation for full-time employment, (2) preparation for postsecondary prebaccalaureate technical education, and (3) the more general role of teaching academic and career development skills. Literature and practice suggest that currently there are at least five variations of these three missions being proposed and/or practiced in the field: traditional, tech prep, traditional combined with tech prep (TTP), education through occupation (ETO), and work/family/community/technology (WFCT).

Traditional

The traditional mission of CTE, except perhaps of family and consumer sciences and technology education, is preparation for the transition from school to work. The performance objective is to provide students with occupational skills that result in labor-market advantage when competing for nonprofessional career opportunities. The content of the curriculum is primarily determined by occupational task analyses and input from business/industry advisory committees. Outcome assessment is based on related job placement, annual earnings, and retention on the job.

Tech Prep

The mission of tech prep is to prepare students to make the transition from high school to postsecondary prebaccalaureate technical education. Although the concept is not necessarily new (2+2 programs were first discussed in the 1960s), the recent stimulus for the tech prep model can be traced to the Perkins Act of 1990 and the work of Dale Parnell. As defined by the Perkins Act, tech prep is a combined or articulated secondary and postsecondary program that leads to an associate degree or certificate in at least one field of engineering technology; applied science; a mechanical, industrial, or practical art or trade; agriculture; health occupations; or business. The funding of tech prep in this and subsequent CTE funding legislation signaled a new addition to the federal mission for CTE—preparation for postsecondary education prebaccalaureate technical education.

The high school-level performance goals for tech prep are academic and technical skills at a level necessary to pursue postsecondary prebaccalaureate technical education without the need for remediation in college. The outcome assessment is based upon the transition to postsecondary technical education without remediation, postsecondary graduation, and employment in a technical field as identified in the legislation.

Traditional/Tech Prep (TTP)

Whereas both traditional and tech prep are designated by the federal funding legislation as missions of CTE, and whereas many traditional programs have added tech prep components, a third mission very prevalent in the field is preparing students for both full-time employment and postsecondary technical education. Across the country, many if not most (exact data are not available) traditional CTE programs also are now state-approved tech prep programs as well. Typically, some graduates of these programs go on to postsecondary technical education and some to full-time employment. Thus, the curriculum is designed to prepare students for both outcomes. As a result, some students pursue both full-time employment and postsecondary education on a part-time basis, often with tuition assistance from their employer.

Education through Occupation (ETO)

The mission of education through occupations (ETO) (Grubb 1997) is based upon the concept that when woven together, academic and vocational integration acts as the foundation for education through occupations when (Bragg 1997)—

- broadened occupational content (clusters) is integrated with
- traditional academic subjects (math, science etc.) using
- new institutional structures (career pathways etc.) and
- other types of school to work (work-based learning).

Unlike traditional vocational education, where the intent is to teach skills identified as being related to occupational success and thus labor-market advantage, the ETO mission for CTE is akin to the early 20th-century view of education philosopher John Dewey. The philosophy is summarized by Rosenstock ("Where Is Voc Ed Headed?" 1996), who argues that the real value of skills training lies not in labor-market outcomes but in "accessing academic skills." Thus, CTE could be for all students who learn best in a contextual modality as opposed to the conceptual/abstract modality that currently dominates the high school college-prep curriculum.

ETO is predicated on an assumption that in the future, little labor-market advantage will be gained from skills training at the high school level because the entry-level credential for high-skill/high-wage work will be a 2-year associate degree in the technologies. Therefore, moving away from skills training in high school to a more general occupational education will not hurt students who go to work. Implied, though not stated, is the belief that for those students who do go to work, on-the-job training or cooperative education (as prescribed in the school-to-work legislation) would be a more effective method for facilitating their transition.

ETO proponents also argue that a more general type of high school occupational education (sometimes referred to as a new vocationalism) will be of value to all high school students. It is hoped that when occupational education becomes more general and more academic (and by so doing becomes viewed as complementary to the transition to higher education), then it will be more attractive to students from middle-class families (Grubb 1997). The result would be increased enrollments.

At the heart of the ETO movement is the old, yet still unresolved, issue of the common school versus differentiated curriculum approach to a high school education. Pennington ("Where Is Voc Ed Headed?" 1996) expresses a common ETO argument, pointing out that now that almost every adult engages in further education, they all need the "same" program of study.

Social reconstruction advocates also endorse the ETO model. Larke ("Where Is Voc Ed Headed?" 1996) argues, for example, that "when we're looking at who participates in college prep and tech prep there is a division by race, class, and gender...Whether or not it is the intent of the education system the fact remains that it happens" (p. 25). The implied solution is a common curriculum for all. Proponents of the ETO approach also frequently voice conventional wisdom about the inappropriateness of high school-aged students making career choices; in light of this belief, high school vocational education should not require such commitments.

In summary, the ETO model is quite similar in mission to the historical model of occupational education used in manual arts/industrial arts, now technology education. Performance goals are traditional academic measures though the means of assessment would be more authentic in nature. The outcome goals are only loosely related to employment, seeking instead to generalize the curriculum into a more academic and career exploration mode. Probable outcome goals would include postsecondary enrollment without remediation, and retention. To quote Parnell: "A portion [of vocational education] will still be a laboratory experience, but it will be much broader approach to prepare students for the next step at the postsecondary level or some kind of apprentice program" ("Where Is Voc Ed Headed?" 1996, p. 24).

Work/Family/Community/Technology (WFCT)

The work/family/community/technology model presents a fifth possible mission for CTE. As outlined by Copa and Plihal (1996), the purpose of CTE in this model is to "enhance the vocational development characteristic of an educated person" (p. 91). Vocational development is defined as the ability of an individual to integrate work, family, and community; to these three we (not Copa and Plihal) have added technology. What is important for CTE teacher educators, this proposal seeks a common ground for combining all CTE programs, including family and consumer sciences and technology education, into a single broad field of study. Occupational performance competencies are not instructional objectives. Instead, the emphasis is on general work roles and responsibilities independent of any particular occupation or career. The stated mission of the program suggests academic performance goals, higher education without remediation, and retention as the outcome goals.

Which Mission? What Content?

Traditional, Tech Prep, Traditional/Tech Prep (TTP), Education through Occupations (ETO), or Work/Family/Community/Technology (WFCT): which of the five CTE missions and thus content will prevail in the future? It is argued that present developments suggest two missions will dominate CTE programs in the public schools: TTP and the more general combination of ETO/WFCT/Tech Prep. The following is the rationale for this conclusion.

Traditional/Tech Prep and Work-Bound Students

The historical mission of CTE has been to provide a curriculum for those students who stayed in high school but then went to work after graduation or become homemakers. Some advocates of ETO and WFCT argue that this mission is obsolete because now all students go to college. But national longitudinal follow-up data would suggest otherwise. At least one-third of all students do not enter college within 2 years of high school graduation. Of those who do enter college, 30% drop out during their freshman year. Only about half of those who persist graduate in 6 years, and of those who do not graduate within 6 years only 10% ever finish a degree (Gray and Herr 2000). Unless college becomes absolutely free and mandatory, it is unlikely that the percentage of students matriculating directly after high school will increase much more and only time will tell if the graduation rate improves for those who do matriculate.

If preparation for full-time employment is still needed for some high school students, what is the appropriate curriculum: (1) occupational skills training (TTP), (2) a common core academic curriculum (ETO), or (3) general preparation for the individual role as a worker within the context of family, community, and technology (WFCT)? Grubb (1997) suggests that the practices of teachers and administrators will determine the answer. Gray (1997) suggests instead that it will be the perceptions of the true decisions makers in the high school curriculum process—parents and students as they select high school courses—who will determine the future. Career and technical education is an elective in the curriculum of the U.S. high school; courses that students do not select are eliminated. The CTE programs that have experienced the least decline over the last 15 years are within the T&I/health occupations grouping, the programs with the strongest traditional ties to employers, occupational skill education, and job placement (Levesque et al. 2000). This suggests that some students and parents value a program that leads to full-time employment after graduation from high school.

Aside from the fact that at least one-third of all high students do not go to college, there are a number of other reasons to believe that TTP will be a prevalent CTE model in the future. First, it is the model funded by federal CTE legislation. Second, many states have invested heavily in traditional T&I/health occupations/agricultural education facilities, programs, and staffs. Third, this type of education has tremendous face validity; it has the support of the general public, even if not preferred for their own children ("What Do People Think of Us?" 1997). In fact, the vast majority of CTE funding comes from state and local, not federal, dollars. Fourth, traditional CTE has been historically effective in keeping teens in high school; dropout prevention alone is a good enough reason for local education agencies to support traditional CTE. The reality is that, although traditional CTE has fallen out of favor among national policy makers—

at least during the Clinton administration—it is still strongly supported at the local level by employers, many of whom are former CTE students.

Finally, and perhaps most important, traditional/tech prep CTE programs are the prime feeder of high school students to postsecondary technical education. Students who concentrate in the college preparatory programs in high school do not, as a rule, go on to postsecondary prebaccalaureate technical education; they go to 4-year colleges/universities or general studies transfer programs at community colleges or university branch campuses. This fact suggests that a strong postsecondary technical school system depends upon a strong traditional/tech prep secondary system, and if the latter were eliminated, the former would soon follow. Considering the present international shortage of technicians trained at the 1- and 2-year postsecondary level, the nexus between high school and college technical education alone makes a strong case for continuation of TTP.

Thus, it is predicted that one of the CTE models/missions likely to survive is the traditional model with a tech prep component or TTP. A close look at developments in the mid-1990s provides evidence for this prediction. By the mid-1990s, many regional CTE programs/schools had not only adopted the dual mission of traditional/tech prep but had moved beyond the 2+2 concept to a 1+1 system. In such a system, the first year of a technical education associate degree is actually offered as part of the senior year of high school vocational education; students are thus dually enrolled in both high school and college. This development is particularly evident in those states that have developed regional secondary-level vocational education centers and postsecondary community or technical colleges. Promoting this development is the reality that, in many states, the secondary-level vocational education facilities have better instructional labs than most postsecondary providers. Thus, as states seek to increase the percentage of students pursuing 2-year technical education, financial considerations alone will promote a closer union of the two systems.

The traditional/tech prep model would seem to be applicable to the following CTE programs in most states and in most districts: T&I/health occupations, business education, marketing/distributive education, vocational home economics, and vocational agriculture. Present developments suggest, however, that family and consumer sciences, technology education, and perhaps even agricultural education in some states and in some districts will not pursue a TTP mission but instead some form of ETO and/or WFCT.

ETO/WFCT/TP

The ETO and/or WFCT mission has already been adopted by some career and technical education programs, and many if not all of these programs have endorsed the tech prep mission as well. Agricultural education, in some states and in some districts, has already decided to move in the ETO/WFCT direction by becoming a science course, and many of its students have always gone on to college. As a result of the Reinventing Agricultural Education in Pennsylvania for the Year 2020 initiative funded by the W. K. Kellogg Foundation, the new vision is "educating people for life through agriculture: food, fiber, and natural resource systems" (Professional Personnel Development Center for Vocational Education 1999, p. 3). Many technol-

sional Personnel Development Center for Vocational Education 1999, p. 3). Many technology education students go on to college, and the program was never intended to be occupational training (though at the local level it often has become that). Family and consumer sciences is clearly consistent with WFCT. Indicative of this general education trend in some CTE programs, the New Jersey Department of Education ruled in December 2000 that it would now accept family and consumer sciences and technology education as components of its visual and performing arts graduation requirements.

Thus, because it is unclear that any one mission will be adopted by all career and technical education programs, it seems prudent to continue the policy analysis of CTE teacher education reform based upon the assumption that there will be two main types of CTE programs: TTP and ETO/WFCT/TP.

Policy Recommendations for CTE State Licensure Regulations

The public policy issue under consideration is CTE teacher licensure and preparation. The philosophical assumption of the analysis is that the specifics of CTE teacher licensure/preparation should be dictated by the missions of the programs in which candidates will be teaching in the local schools. Furthermore, given that there are at least six different program areas typically identified with CTE (agriculture, business education, family and consumer sciences, marketing/distributive education, technology education, trade and industrial/health occupations), it is unlikely that there will be just one mission endorsed by all programs. In fact it is quite possible that the same program will have differing missions in different states and in different local districts within states.

At the same time, making policy recommendations for all the possible combinations of the five different missions identified in the preceding chapter is unrealistic. Therefore, for the purposes of this analysis, the two overarching missions for CTE in the public schools are emphasized: Traditional/Tech Prep and the combination of Education through Occupations, Work/Family/Community/Technology, and Tech Prep.

The analysis now proceeds by cross-tabulating the five CTE teacher licensure variables discussed earlier (occupational/technical/subject-matter knowledge, academic credentials, instructional design and delivery, general education, and outcome assessment) with the two overarching missions. Then a recommendation is made for each variable within each of the two missions (see matrix). What follows is a discussion of the recommendations for TTP and ETO/WFCT/TP licensure. Separate recommendations are made for teacher preparation programs in the next chapter.

CTE Teacher Licensure/Preparation Recommendations

Mission	Occ/Tech Subject-Matter Knowledge	Minimum Academic Credentials	Instructional Design and Delivery (Pedagogy)	General Education	Outcome Assessment
Traditional/ Tech Prep	Work experience/ technical associate degree required	Technical degree or certificate(s); bachelor's for permanent licensure	General and shop specific	Work force specific; required for permanent certification	Occupational knowledge and authentic classroom
Education through Occupations, Work/Family/ Community/ Technology, Tech Prep	Work experience preferred	Bachelor's degree	General	Work force specific	Authentic classroom

Mission I: Traditional/Tech Prep

Occupational/Technical/Subject-Matter Knowledge

Because teaching occupational skills is an instructional objective in the traditional/tech prep model, occupational/technical knowledge is necessary. The primary question is, Where will individuals preparing to teach in traditional/tech prep CTE programs learn that body of occupation/technical knowledge and how will it assessed? There would seem to be three options for candidates to acquire this knowledge: on-the-job experience and training, formal degree programs, or a combination of work experience and higher education. The latter is the recommended option.

Typically, occupational skill sets and the related body of general and technical knowledge associated with careers addressed in CTE are not taught on university campuses. Increasingly, however, they are taught at the postsecondary, prebaccalaureate, certificate/associate degree level. Therefore, much of the technical knowledge in many fields, or occupational clusters, could be gained at the postsecondary prebaccalaureate level, thus eliminating the need for extensive work experience.

At the same time, however, some work experience is still desirable even when candidates have relevant higher education. Preparing students to deal with the relevant work culture is critical to successful placement. Those who have the insight best accomplish the teaching of this type of content when they have actual paid work experience in the field. Thus, it is recommended that licensure requirements for TTP dictate that an associate degree or equivalent occupational certificates in a relevant technology be the minimum academic credentials requirement and that some paid work experience (1 year or 2,000 hours) also be required. Typically, gaining this experience does not pose a problem since the majority of certificate and associate degree students have ample paid work experience before they graduate. The policy implication is that teaching occupational/technical knowledge is not the responsibility of the teacher education programs, although validating/assessing that candidates are in fact subject-matter experts may continue to be a requirement.

Minimum Academic Credentials

It is recommended that all TTP teachers be required to hold a postsecondary degree for initial certification. The minimum degree accepted should be at the associate/certificate level. The vast majority of new CTE teachers hold at least an associate degree at present so this recommendation should do little to restrict the supply of teachers. Further, it is recommended that a bachelor's degree be required for permanent certification (most states provide for at least two levels of certification, initial and permanent). Suffice it to say that if CTE is to gain its proper place in the eyes of both the public and the teaching profession, continuing to have nondegree teachers is a practice that may be dominant now but has no future. Furthermore, with evidence suggesting that the majority of the new T&I teachers now have at least an associate degree, requiring a bachelor's degree for permanent licensure is no longer such a dramatic change. However, it is only fair that states also ensure that associate degree holders can transfer to baccalaureate granting institutions without losing all of their earned credits.

Instructional Design and Delivery (Pedagogy)

In the TTP model, state licensure requirements should mandate that candidates master specific competencies in instructional design and delivery before entering the classroom. However, because a 4-year degree is not required, it is not realistic to require them to have completed a formal teacher preparation program. Thus, this training could be coursework, or it could be an intensive train-the-trainer type seminar(s), but most include on-the-job clinical supervision of instruction during the first year of teaching. TTP instruction typically takes place in occupational instruction laboratories (shops). Thus, TTP teachers need specific training in classroom/laboratory safety and management.

General Education

The relevance of general knowledge for TTP teachers is debatable. In reality, the issue really hinges on whether or not states have a general education test as part of the teacher licensure/certification programs, and if so, whether TTP teachers are exempted. It is recommended that in states that have such tests, TTP teachers not be exempted from the requirement. Rather, it is recommended that they be given either a different test that is more work force specific or additional time to pass the test if they do not have a 4-year college degree (it could, for example, be a requirement for permanent licensure instead of initial licensure).

Outcome Assessment

Two types of outcome assessments are desirable for the licensure of beginning teachers in TTP programs. The first is an assessment of their subject-matter expertise. This is typically accomplished by either standardized trade competency tests or actual authentic assessment by a review committee of subject-matter experts such as program craft committees, etc. The second issue is an assessment of the candidate's skills as a teacher. Because some TTP teachers will not have completed a formal teacher preparation program and thus not done practice teaching, this assessment will have to take place during their first or second year in the classroom.

Mission II: ETO/WFCT/TP

Occupational/Technical/Subject-Matter Knowledge

In ETO/WFCT/TP, teaching occupation-specific skills is not an instructional objective, thus extensive occupational/technical knowledge is not necessary. It can be argued, however, that nonteaching work experience is still necessary. If the goal of ETO is to teach academic skills using an occupational context, where is the beginning teacher to get the necessary background to create this occupational context? A similar question can be raised regarding WFCT. Hartley, Mantle-Bromley, and Cobb (1996) propose, for example, that new CTE teachers have the skills to develop a sequential series of work-based clinical experiences. However, one of the main reasons academic teachers currently do not use much occupational content, let alone clinical experience, is that they know little about occupations outside of education. Thus, although work experience may not be required, some paid nonteaching occupational experience would

seem preferable for both ETO and WFCT teacher candidates. Again, data suggest most CTE teachers have nonteaching work experience.

Academic Credentials, Pedagogy, General Knowledge, and Assessment

The mission of ETO/WFCT/TP is not the transition from school to work but teaching academics, general knowledge of work roles, and perhaps preparing students for the transition to postsecondary education. These goals are similar to those of other high school subject areas. Thus, it would seem that, other than requiring some amount of nonteaching work experience, state licensure requirements should be similar to those of other high school content areas. This is by and large a status quo recommendation. Virtually all CTE teacher state-level licensure requirements, except those in T&I/health occupations, follow the framework required of other high school teachers.

Implications

Two different recommendations have been made for CTE teacher licensure: one for teachers in TTP programs and one for teachers in ETO/WFCT/TP programs. The defining difference between the two program types is whether student outcome goals of a candidate's teaching assignment include preparation for full-time employment and/or the transition to postsecondary prebaccalaureate technical education.

The implication is that in the future there would be only two types of CTE state licensure: TTP and ETO/WFCT/TP. No longer would there be different certifications/licensure for each of the six different CTE programs. The issue remains, however, that at the school level program distinctions such as business education, technology education, agriculture, etc., will remain. Thus, for this proposal to be viable some group at some level must debate and decide what in fact is the mission of the program area. This could be done at the national, state, or even local level with each district determining the missions of its CTE programs and then requiring the relevant certification accordingly.

By way of example, consider the program area of business education. What is the mission: TTP or ETO/WFCT/TP? This is not an easy question. Traditionally, the role of business education in the U.S. high school has been the preparation of students for careers as office assistants and for going on to postsecondary 1- and 2-year business/secretarial schools, thus TTP. As more and more traditional consumers of high school business education, namely teenage girls, decided that they preferred to be college graduates rather than secretaries, business education enrollments plummeted in the 1980s. As a result, many business education programs in comprehensive high schools are now really skill-building courses for the college bound who need word processing and spreadsheet skills; very few students actually take a sequential set of business education courses. So is the mission still TTP, or now is it the more general ETO? A similar scenario applies to technology education, agriculture, and family and consumer sciences. In some high schools, the mission of the programs is TTP, in others more like ETO/TP, or, in the case of family and consumer sciences, more like WFCT/TP.

The point is that someone has to decide what the mission is and that decision in turn would dictate which of the two types of CTE licensure candidates most hold. There is, of course, one clear advantage to this process. School officials at all levels will be forced to contemplate and answer the question, What is the mission of CTE in their schools?

Recommendations for CTE Teacher Preparation Reform

Given the recommendations made previously for CTE state-level teacher licensure regulations, we now turn to the question of the content of teacher preparation programs that prepare students to meet these requirements for licensure.

Program Content

Training for teaching effectiveness is necessary regardless of mission. As suggested by the demand for train-the-trainer programs in business/industry and on the part of labor unions, it is clear that the old adage that people from the workplace are always natural teachers is hogwash. As the National Board for Professional Teaching Standards (NBPTS) states:

> Knowledge of subject matter is not synonymous with knowledge of how to reveal content to students so they might build it into their systems of thinking. Accomplished teachers possess what is sometimes called "pedagogical knowledge." Such understanding is the joint product of wisdom about teaching, learning, students and content. (NBPTS 2001, http://www.nbpts.org/standards/know_do/prop_2.html)

Pedagogy

The starting points for the design of CTE teacher preparation programs are the fundamental requirements for proficient teaching as outlined by NBPTS (2001, http://www.nbpts.org/standards/know_do/know_do.html):

- A broad grounding in the liberal arts and sciences
- Knowledge of the subjects to be taught
- Knowledge of the skills to be developed
- Knowledge of the curricular arrangements and materials that organize and embody that content
- Knowledge of general and subject-specific methods for teaching and for evaluating student learning
- Knowledge of students and human development
- Skills in effectively teaching students from racially, ethnically, and socioeconomically diverse backgrounds
- Skills, capacities, and dispositions to employ such knowledge wisely in the interest of students

Teacher preparation programs leading to licensure regardless of mission should be designed to equip individuals with the following additional competencies in order to ensure that CTE teachers develop the skills and knowledge to—

- Provide students with information and experiences that will assist them with career development planning and decision making
- Model their understanding of appropriate professional and ethical practices
- Develop programs based upon models of effective instructional designs and techniques
- Integrate academic and technical skills in an applied occupational context
- Participate in developing Individualized Education Plans for special needs learners, revise curricula to align with the plans, and adapt their instructional methods to fulfill the plans
- Evaluate, select, and use instructional resources and technology
- Provide students with multiple clinical experiences including supervised work-based learning

In addition to these elements, teacher education programs aimed at preparing CTE teachers when the mission is Traditional/Tech Prep should enable program graduates to—

- Analyze the classroom/laboratory environment and develop a plan to maximize the effectiveness of the instructional program as well as safeguard the health and well-being of all
- Design and deliver instruction within the competency-based methodology
- Identify and involve relevant stakeholder groups
- Develop and cultivate business, industry, and community partnerships
- Implement Tech Prep fundamentals
- Plan, initiate, and supervise work-based learning
- Assist in the postgraduation placement of students

General Knowledge

Basic literacy is also necessary for teachers regardless of the CTE program mission. Defining what literacy means is another matter, as is the question of whether the same level or type is needed for the two different CTE missions. To some extent, the broad structure of general knowledge requirements will be dictated by the general education degree requirements of various institutions of higher education. Often, for example, students must take a prescribed number of humanities, mathematics, and science credits for graduation. CTE teacher preparation programs have, however, some latitude in tailoring courses to meet institutional degree requirements.

Lynch (1996) suggests a possible framework for general knowledge requirements. Aside from pedagogy, he recommends two other broad content areas: work force education and general education/liberal arts. Within work force education, he includes such topics as sociology and economics of the workplace, family and community, career development theory, work and the environment, and employer/employee organizations. General education/liberal arts includes those subject areas typically required for higher education degrees that, as he points out, are a continuing subject of debate among college faculty members.

In ***Workforce Education: The Basics***, Gray and Herr (1998) follow much the same format as Lynch. The authors identify the knowledge base of the field (a requirement for national accreditation) as human capital development theory, labor economics, sociology of work, and

career development theory. Also emphasized are professionalism, mission, ethics, human resource development in industry, and work force development public policy.

CTE teacher education programs should provide graduates with general education experiences that will enable them to build the following elements into their instructional programs:

- Human capital development theory and labor economics
- The sociology of work, family, community
- Career development theory and practice
- Environmental/social implications of global economics
- Work force development public policy

New Teacher Performance Assessment

Considering the direction of accreditation groups such as NCATE and state licensure requirements, such as those in Ohio, it is clear that outcome-based assessment is on the horizon. The main implication of this development is the likelihood that in some states CTE teacher preparation programs will either be required, or asked if they desire, to be involved in the authentic assessment of their graduates' actual performances on the job.

Ohio's model of assessing beginning teachers in the classroom during the first 2 years of experience is an indicator of things to come. CTE teacher preparation programs should begin to develop plans as to how they can be a part of this process. In Pennsylvania, for example, three universities (Indiana University, Penn State, and Temple) are funded by the state to provided clinical supervision to new T&I teachers in their classrooms during their first 2 years in the classroom.

Programs Organized around Mission, Not Program Titles

Those who seek to reform the existing university-based CTE teacher education programs should consider redesigning the programs based upon mission, not occupational content or existing program titles. Two overarching missions have been offered: (1) Traditional/Tech Prep and (2) Education through Occupations/Work, Family, Community, and Technology/Tech Prep. The major advantage to this approach is that it offers a rationale for downsizing teacher preparation programs that historically have attempted to provide unique instruction in all, or many, of the traditional six CTE program areas. Although few CTE teacher preparation programs can now offer multiple different CTE teacher preparation programs, they can realistically design two.

Alternative Route Licensure Models

Two dynamic but contradictory forces affect CTE teacher licensure and preparation. On the one hand, policy makers continue to propose more stringent teacher licensing/licensure re-

quirements, and teacher education faculty seek corresponding reforms such as outcome-based programs and more clinical practice experiences.

On the other hand, school systems cannot find teachers, students do not have permanent teachers, and parents are angry. Thus, pressures mount on those same policy makers and teacher preparation programs to develop/approve a host of alternative routes, including online teacher licensure via the Internet, or just look the other way. This is definitely the situation in CTE.

It is quite possible that with the prediction of 1 million or more teacher vacancies to fill in the next 10 years, teachers who enter the profession using alternate licensure routes may outnumber those who complete a formal teacher preparation program. It is also quite possible that in light of the growing underemployment of 4-year college graduates, more teachers will be begin their careers in education having a relevant 4-year college degree but no formal pedagogical training. As suggested in the press, the United States could have both the most rigorous teacher education requirements and the highest percentage of uncertified teachers in the classroom. It is speculated that if great numbers of individuals enter the teacher profession in the next 10 years using alternate routes, then the alternative model will become an accepted practice, if not the norm. CTE is not just subject to this reality but in fact is more in harm's way.

Developing alternative teacher preparation routes is critical for career and technical education because teacher shortages threaten the field's very existence. As CTE professionals consider how to initiate reforms, both teacher preparation and secondary-level program enrollments are in danger of being locked in a downward spiral.

When school districts are unable to find a teacher for a CTE program, and the program is not mandated, there are only two options: hire someone using the alternate/emergency licensure route or *drop the program*. However, the alternative route is not commonly used in any CTE programs save the T&I/health occupations grouping. Thus, the present teacher shortage could well lead to another round of program closings, even fewer teacher licensure candidates, and another wave of CTE teacher preparation program closings. Just such a scenario led Volk (1997) to predict the total demise of technology education teacher preparation.

One thing seems absolutely certain: either the number of CTE programs will decline dramatically or the number of teachers certified through some alternate route will increase dramatically. This leads to the further recommendation that *all CTE teacher preparation programs, regardless of mission, develop alternative licensure programs that do not require full-time enrollment.*

The reality is that *all* CTE teacher preparation programs would be wise to think about how they can be a component of an alternate teacher licensure model. Our view of the labor market for CTE teachers suggests that those who come through the alternative licensure route could soon outnumber those who complete the formal full-time teacher preparation model. Again, it is wise for members of the CTE community to remember that, when faced with an empty classroom, the only choices available to the administrators responsible for the institution are to hire someone through the alternative route or close the program.

Additional Recommendations

Modify State CTE Teacher Licensure Requirements

This analysis would suggest that all CTE state-level teacher licensure could be reduced to just two: TTP and ETO/WFCT/TP. Although unique program titles, such as business education, agriculture, etc., will remain at the local level, the relevant certification of teachers in these program will be determined locally according to the mission of the program. Thus in some schools, family and consumer sciences may actually be vocational in nature and thus part of TTP, whereas in most schools it will more likely be ETO/WFCT/TP. Districts should be required to have on file a mission statement for each CTE program and hire teachers with the appropriate certification.

Of all CTE teacher licensure, the T&I/health occupations grouping will require the most change. In general, they tend to be to occupationally specific and inflexible. In some states these regulations actually are a major obstacle to the development of programs based upon occupational clusters, requiring an instructor to be certified in all occupational areas within the cluster. The recommendation is to eliminate those occupational licensure titles that are based upon obsolete labor market assumptions and hinder program flexibility to address broad-based occupational clusters. Then, using this analysis as a guide, change the licensure specifics as necessary. The potential/desired outcome of this process is that all existing TTP certificates will be reduced to one (TTP) with a limited number of endorsements that relate directly to the 16 broad clustered definitions currently being developed at the federal level.

Link CTE Licensure/Preparation Reform to Federal Funding

This document is the latest of in a series of efforts to change CTE teacher licensure and preparation. Most have not resulted in any significant change. Arguably, the main reason for those failures is that the efforts tend to be national in scope, whereas teacher licensure and thus preparation are state-level issues. Although teacher licensure/preparation requirements have changed dramatically in virtually every state, CTE, especially T&I, has not changed much at all. In fact, in many states, the tactic has been to get exemptions to the various pieces of reform legislation. *Ultimately, CTE teacher licensure/preparation reform comes down to the question of how to get the states to act.*

It is instructive to recall that the founders of the vocational education movement faced the same challenge: how to get the states to hire adequately prepared teachers. The approach they selected was to specify in the federal act minimum credentials for vocational teachers and administrators with which states had to comply in order to receive funding. A state had to have, for example, a state director of vocational education. States were also required to ensure that teachers had appropriate occupational experience. It is recommended that such a policy implementation strategy be employed to ensure national adoption of CTE teacher licensure

and preparation reforms by making it a condition for federal funds provided by both the Perkins Act and tech prep legislation.

Develop an Implementation/Phase-in Strategy

A second major reason CTE teacher licensure/preparation does not change at the state level is the lack of an accompanying proposal for how to get from the old to the new. Faced with not being able to find teachers, local administrators are typically cool about changing licensure requirements other than to loosen them. Thus, it is recommended that a program to phase in these changes be developed to provide local schools districts, vocational administrators, and teacher preparation programs with the time needed to make the adjustments. This implementation plan should be developed as part of the reform proposal. Having such a plan will do much to win support for the changes from these important constituents. This is particularly true for CTE administrators who may philosophically support change but cannot find teachers who are able to meet the existing regulations. A phase-in plan goes a long way toward lessening these legitimate concerns.

References

American Association of Family and Consumer Sciences. "Council for Certification." <http://www.aafcs.org/certification/index.html>

American Association of State Colleges and Universities. ***Changing Course: Teacher Education Reform at State Colleges and Universities***. Washington, DC: American Association of State Colleges and Universities; Oshkosh, WI: Teacher Education Council of State Colleges and Universities, 1995.

Bailey, T., and Hughes, K. "The Prospects for Work-based Learning." **Centerwork** (National Center for Research in Vocational Education) 10, nos. 3-4 (Fall-Winter 1999): 17-18.

Ballou, D., and Podgursky, M. "The Case against Teacher Certification." ***Public Interest*** no. 132 (Summer 1998): 17-29.

Boesel, D. et al. ***National Assessment of Vocational Education: Final Report to Congress. Vol. II: Participation in and Quality of Vocational Education***. Washington, DC: National Assessment of Vocational Education, Office of Educational Research and Improvement, U.S. Department of Education, 1994. (ERIC Document Reproduction Service No. ED 371 192)

Bragg, D. D. "Grubb's Case for Compromise: Can 'Education through Occupations' Be More." ***Journal of Vocational Education Research*** 22, no. 2 (1997): 115-122.

Copa, G. H., and Plihal, J. "General Education and Subject Matter Education Components of the Vocational Education Teacher." In ***Beyond Tradition: Preparing the Teachers of Tomorrow's Workforce***, edited by N. K. Hartley and T. L. Wentling, pp. 91-112. Columbia: University Council for Vocational Education, University of Missouri, 1996. (ERIC Document Reproduction Service No. ED 400 443)

Darling-Hammond, L. ***Solving the Dilemmas of Teacher Supply, Demand, and Standards***. New York: National Commission on Teaching and America's Future, Teachers College, Columbia University, 2000. <http://www.tc.edu/nctaf/publications/solving.html>

Dohm, A. "Gauging the Labor Force Effects of Retiring Baby-boomers." ***Monthly Labor Review*** 123, no. 7 (July 2000): 17-25.

Dykman, A. "Who Will Teach the Teachers?" ***Vocational Education Journal*** 68, no. 6 (September 1993): 23-27, 53.

"ED Announces Grant Solicitation for Career Clusters." ***Vocational Training News***, December, 7, 2000, p. 3.

Feistritzer, E. ***Alternative Routes to Teaching Escalate in Just the Last Two Years***. Washington, DC: National Center for Education Information, 2000. <http://www.ncei.com/NR020300.htm>

Gray, K. C. "Vocationalism Revisited: The Role of Business and Industry in the Transformation of the Schools." ***Journal of Vocational Education Research*** 13, no. 4 (Fall 1988): 1-15.

Gray, K. "The Gatekeepers." ***Techniques: Making Education and Career Connections*** 71, no. 9 (January 1997): 24-27.

Gray, K. ***Getting Real: Helping Teens Find Their Future***. Thousand Oaks, CA; Corwin Press, 2000.

Gray K., and Herr, E. ***Workforce Education: The Basics***. Needham, MA: Allyn and Bacon, 1998.

Gray, K., and Herr, E. ***Other Ways to Win: Creating Alternatives for High School Graduates. 2d ed***. Thousand Oaks, CA: Corwin Press, 2000.

Gray, K. C., and Wang, D. S. "Performance of Beginning Trade and Industrial Instructors on State-Mandated Basic Skill Tests: The Connecticut Experience." ***Journal of Industrial Teacher Education*** 26, no. 3 (Spring 1989): 50-58 .

Grubb, N. "Not There Yet: Prospects and Problems for Education through Occupations." ***Journal of Vocational Education Research*** 22, no. 2 (1997): 77-94.

Hartley, N. K., and Wentling, T. L., eds. ***Beyond Tradition: Preparing the Teachers of Tomorrow's Workforce***. Columbia: University Council for Vocational Education, University of Missouri, 1996. (ERIC Document Reproduction Service No. ED 440 443)

Hartley, N.; Mantle-Bromley, C.; and Cobb, R. B. "Building a Context for Reform." In ***Beyond Tradition, Preparing the Teachers of Tomorrow's Workforce***, edited by N. K. Hartley and T. L. Wentling, pp. 23-52. Columbia: University Council for Vocational Education, University of Missouri, 1996. (ERIC Document Reproduction Service No. ED 440 443)

Harvey, M. "Perceptions of Vocational Special Needs: Concerns and Comparisons from Area Vocational Technical Center and Comprehensive High School Educators." ***Workforce Education Forum*** 26, no. 1 (1999): 40-57.

Hawley, W. D., ed. ***The Alternative Certification of Teachers.*** Washington, DC: ERIC Clearinghouse on Teacher Education, American Association of Colleges for Teacher Education, 1992. (ERIC Document Reproduction Service No. ED 351 334)

Heaviside, S.; Carey, N.; and Farris, E. ***Public Secondary School Teacher Survey on Vocational Education***. NCES 94-409. Washington, DC: National Center for Education Statistics, U.S. Department of Education, 1994. (ERIC Document Reproduction Service No. ED 367 876)

Hoachlander, G. "More than a Name Change? Transitioning from Vocational to Career and Technical Education." ***Centerwork*** (National Center for Research in Vocational Education) 10, nos. 3-4 (Fall-Winter 1999): 2-4.

Kantrowitz, B., and Wingert, P. "Teachers Wanted." ***Newsweek***, October 2, 2000, pp. 36-42.

Keller, B. "States Move to Improve Teacher Pool." ***Education Week***, June 14, 2000, pp. 1, 20.

Koppich, J. E. ***Investing in Teaching***. Washington, DC: National Alliance of Business, Business Roundtable, and National Association of Manufacturers, 2001.

Levesque, K.; Lauen, D.; Teitelbaum, P.; Alt, M.; and Librera, S. ***Vocational Education in the United States: Toward the Year 2000***. NCES 2000-029. Washington, DC: National Center for Education Statistics, U.S. Department of Education, 2000. (ERIC Document Reproduction Service No. ED 437 583)

Lewis, L.; Parsad, B.; Carey, N.; Bartfai, N.; Farris, E.; and Smerdon, B. ***Teacher Quality: A Report on the Preparation and Qualifications of Public School Teachers***. NCES 1999-080. Washington, DC: National Center for Education Statistics, U.S. Department of Education, 1999. (ERIC Document Reproduction Service No. ED 427 009)

Lynch, R. L. "The Past, Present and Future of Vocational and Technical Education." In ***Beyond Tradition, Preparing the Teachers of Tomorrow's Workforce***, edited by N. K. Hartley and T. L. Wentling, pp. 1-22. Columbia: University Council for Vocational Education, University of Missouri, 1996. (ERIC Document Reproduction Service No. ED 440 443)

Lynch, R. L. ***Designing Vocational and Technical Education for the 21st Century. Information Series no. 368***. Columbus: ERIC Clearinghouse on Adult, Career, and Vocational Education, Center on Education and Training for Employment, the Ohio State University, 1997. (ERIC Document Reproduction Service No. ED 405 499) <http://ericacve.org/majorpubs.asp>

Maley, D. ***Cluster Concept in Vocational Education***. Chicago, IL: American Technical Society, 1975.

National Board for Professional Teaching Standards. ***What Teachers Should Know and Be Able to Do.*** 2001. <http://www.nbpts.org/standards/know_do/intro.html>

National Occupational Competency Testing Institute. ***A Profile on the Use of NOCTI Experienced Worker Test for Teacher Licensure by the 50 States, U.S. Territories, and Canada***. Big Rapid, MI: NOCTI, 1999.

National Research Council. ***Understanding Agriculture: New Directions for Education***. Washington, DC: National Academy Press, 1988.

Olson, L. "Taking a Different Road to Teaching." In ***Quality Counts 2000: Who Should Teach? Education Week***, January 13, 2000. <http://www.edweek.org/sreports/qc00/>

Preparation of Professional Educators, Chapter 354, General Provisions, Annex A, Title 22, Part XVI Standards. The Public School Code of 1949 (24 P.S. 1-101—27-2702). October 7, 2000.

Professional Personnel Development Center for Vocational Education. ***A New Dawn for Agricultural Education***. University Park: PPDCVE, Pennsylvania State University, 1999.

Rand Corporation. ***Integrating Academic and Vocational Education: Lessons from Early Innovators. Policy Brief no. 3***. Santa Monica, CA: Rand Corporation, 1994. (ERIC Document Reproduction Service No. ED 367 784) <http://www.rand.org/publications/RB/RB8005/>

Rose, L., and Gallup, A. "The 32nd Annual PDK/Gallup Poll of the Public's Attitudes toward the Public Schools." ***Phi Delta Kappan*** 82, no. 1 (September 2000): 41-58.

Volk, K. S. "Going, Going, Gone: Recent Trends in Technology Teacher Education Programs." ***Journal of Technology Education*** 8, no. 2 (Spring 1997): 67-71. <http://scholar.lib.vt.edu/ejournals/JTE/v8n2/Volk.jte-v8n2.html>

Walter, R. "An Analysis of Selected Occupational Competency Assessment Candidate Characteristics and Successful Teaching." Unpublished doctoral dissertation, The Pennsylvania State University, University Park, 1984.

Weston, S. "Teacher Shortage—Supply and Demand." ***Technology Teacher*** 57, no. 1 (September 1997): 6-9.

"What Do People Think of Us?" ***Techniques: Making Education and Career Connections*** 72, no. 6 (September 1997): 14-15.

"Where Is Vocational Education Headed?" ***Techniques: Making Education and Career Connections*** 71, no. 8 (November-December 1996): 24-29.

Wise, A. E., and Leibbrand, J. A. "Standards and Teacher Quality: Entering the New Millennium." ***Phi Delta Kappan*** 81, no. 3 (April 2000): 612-616, 621.